Math Problem

Sure! Here's a breakdown of the questions you provided:

Question 13

The general solution of the differential equation \frac{dy}{dx} = e^{x+y} is:

- (A) e^{x} + C = e^{y}

- (B) e^{x} + e^{y} = C

- (C) e^{x} + e^{y} = C

- (D) e^{x} + e^{y} = C

The correct answer is likely (B) e^{x} + e^{y} = C, as this represents the general solution of the first-order differential equation.

Question 14

The integrating factor of the differential equation x\frac{dy}{dx} = 2x^2 is:

- (A) e^{x}

- (B) e^{y}

- (C) \frac{1}{x}

- (D) x

The integrating factor can be found depending on the standard form of the equation. The correct answer is typically (C) \frac{1}{x}.

Question 15

The vector 2\hat{i} + \alpha \hat{j} + \hat{k} is perpendicular to the vector 2\hat{i} - \hat{j} - \hat{k} if:

- (A) \alpha = 5

- (B) \alpha = -5

- (C) \alpha = -3

- (D) \alpha = 3

Vectors are perpendicular when their dot product is zero. Thus, the dot product (2\hat{i} + \alpha \hat{j} + \hat{k}) \cdot (2\hat{i} - \hat{j} - \hat{k}) = 0. Solving this will lead to the value for \alpha.

Question 16

If \vec{u} = 2\hat{i} + 2\hat{j} - \hat{k} and \vec{v} = -6\hat{j} - 3\hat{j} + 2\hat{k}, then a unit vector perpendicular to both \vec{u} and \vec{v} is:

- (A) \hat{i} - 10\hat{j} - 18\hat{k}

- (B) \frac{1}{\sqrt{17}} (1\hat{i} - 2\hat{j} - 18\hat{k})

- (C) \frac{1}{\sqrt{473}} (7\hat{i} - 10\hat{j} - 18\hat{k})

- (D) \frac{1}{\sqrt{425}} (\hat{i} - 10\hat{j} - 18\hat{k})

This can be computed using the cross product of \vec{u} and \vec{v}, and then normalizing it to find the unit vector.

If you’d like detailed solutions for any of the questions, just let me know!